Original article

Antenatal depression and associated factors among HIV-positive pregnant women in South Gondar zone public health facilities, northwest Ethiopia, a cross-sectional study

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ABSTRACT

Introduction: Depression and HIV/AIDS are estimated to be the world's two leading causes of burden of disease by 2030. Depression during pregnancy is a significant public health problem because it has negative effects on the health of the mother and her fetus. However, evidence on antenatal depression and associated factors among HIV-positive women is scarce in the study area.

Objective: This study was aimed to assess antenatal depression and associated factors among HIV-positive pregnant women attending prevention of mother to child transmission service in South Gondar zone public health facilities, northwest Ethiopia.

Methods: Institutional-based cross-sectional study was conducted on 606 HIV-positive pregnant women. The data were collected by face-to-face interviews and chart review. Edinburgh Perinatal Depression Scale was used to assess antenatal depression. Data were entered into Epi-Data version 4.6 and analyzed by SPSS version 23. Multivariable logistic regression model was fitted and AOR with 95% CI was computed to determine the level of significance.

Results: The prevalence of antenatal depression was 36.4% (95% CI: 32.7, 40.2). Being unmarried (AOR = 2.77, 95% CI: 1.26, 6.07), experienced intimate partner violence during this pregnancy (AOR = 1.50, 95% CI: 1.05, 2.15), ART non-adherence (AOR = 2.18, 95% CI: 1.50, 3.18), and experienced internalized AIDS stigma (AOR = 1.46, 95% CI: 1.02, 2.09) were significantly associated with antenatal depression.

Conclusion and recommendation: In this study, more than one-thirds of HIV-positive pregnant women had antenatal depression. Screening HIV-positive pregnant women for depression and provision of intervention is recommended.

1. Introduction

Depression is characterized by feelings of low self-worth, loss of interest, feelings of regret, restlessness, loss of appetite, feelings of fatigue, and poor concentration.[1] According to the World Health Organization (WHO), depression is one of the leading causes of disability for both males and females. However, the burden of depression is 50% higher in females than males. At its worst, depression can lead to suicide, and globally, around 1 million lives have been lost every year due to suicide.[2] In addition, depression is the most common psychiatric manifestation among people living with the human immunodeficiency virus.[3] Depression and human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) are estimated to be the world's two leading causes of burden of disease by 2030.[4] To promote mental health, international mental health action plans were developed and one of the key objectives of these action plans was to implement strategies for the prevention of mental illness.[5] Ethiopia also sets national mental health strategies to increase mental health care among those special

vulnerable groups that include pregnant women, women in the post-partum period, and people living with HIV/AIDS.[6] Antenatal depression is a syndrome of depression, in which women experience during a period of pregnancy.[7] Globally, the prevalence of antenatal depression is ranged from 15% to 65% and the prevalence is high in low-income and middle-income countries (LAMICs).[8,9] Specifically, HIV-infected pregnant women might be one of the most vulnerable groups, with high rates of depression and psychiatric morbidity.[10] The serious forms of depression characterized by the idea of suicide or self-harming, are also relatively common in pregnancy.[11]

Antenatal depression increases the risk of complications during birth, including prolonged labor and causing long-lasting, even permanent effects on child development and well-being.[12] In addition, low birth weight, preterm births, small for gestational age, delayed cognitive and language, delayed development, behavioral problems, poor academic performance, and emotional problems are some of its complications to the baby. Moreover, it affects maternal health-seeking behavior and increases risky behaviors such as substance use. Antenatal depression among HIV-infected women might also accelerate the progression of HIV infection and increases maternal morbidity and mortality. Furthermore, untreated depression during pregnancy is a risk factor for postpartum depression, and a lower likelihood of exclusive breastfeeding after delivery might increase.[13-19] Though antenatal depression has a devastating effect on the health of the women and the fetus, it has not received much attention in the health care community compared to postnatal depression.[20]

Several studies done in different countries suggest different factors associated with antenatal depression, include; single marital status, being unemployed, unplanned pregnancy, ART non-adherence, length of time on ART, intimate partner violence, poor social support, and history of depression.[21-26]

Reduction of premature mortality from non-communicable diseases through prevention, treatment, and promotion of mental health and well-being is a global agenda as specified in the third component of Sustainable Development Goals (SDGs). One way to achieve this goal may be routine antenatal screening and timely intervention of antenatal depression.

Even though antenatal depression is a serious mental health issue among HIV-positive women, as the author's deep review, there is no study conducted on antenatal depression and its associated factors among HIV-positive pregnant women in Ethiopia. Therefore, the aim of this study was to assess antenatal depression and associated factors among HIV-positive pregnant women attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia.

2. Methods and materials

2.1. Study settings, design, period and population

An institutional-based cross-sectional study was conducted from November 1st/2020 to April 30th/2021. The study was conducted in public health facilities in South Gondar zone, Amhara national regional state, northwest Ethiopia. Debre Tabor is the capital city of the South Gondar administrative zone, which is found 103 km away from Bahir Dar; the capital city of Amhara regional state, and about 666 km away from Addis Ababa (the capital city of Ethiopia). A total of 2,484,929 populations are living in the South Gondar zone of which, 1,227,606 are females. It consists of 18 Woredas.[27] There are eight governmental hospitals and 96 public health centers, 140 private clinics, and 403 health posts (unpublished zonal health office report). The source population were all HIV-positive pregnant women who came for PMTCT service in South Gondar zone public health facilities and HIV-positive pregnant women who came for PMTCT service at the selected public health facilities in South Gondar zone during the study period were the study population.

2.2. Inclusion and exclusion criteria

HIV-positive pregnant women who attended PMTCT service at public health facilities in South Gondar zone were eligible for the study. Women who were critically ill and unable to give a response throughout the data collection period and women under age of 18 were excluded.

### 2.3. Sample size determination and sampling technique

The sample size for this study was determined by using a single population proportion formula based on the following assumptions: 95% level of confidence, and 5% margin of error, 39.4% of antenatal depression among HIV positive pregnant women.[25] $n = \frac{(Z\alpha/2)^2 * p(1-p)}{(d)^2} = \frac{(1.96)^2 * 0.394(1-0.394)}{(0.05)2} = 367$. After considering a design effect of 1.5 and a non-response rate of 10%, we obtained a total sample size of 606.

The calculated sample sizes for the second objective (associated factors) were less than that was computed for the first objective, so we have used the sample size calculated for the first objective as mentioned above.

In the South Gondar zone, there is one comprehensive referral hospital, seven primary governmental hospitals, and 96 public health centers. Thirty-one public health facilities (30%) were selected randomly using a lottery method. Then, the calculated sample size was proportionally allocated to each health facility based on their six months report of cases. Thereafter, the skipping interval (Kth) was calculated by dividing the total number of cases by the calculated sample size (1216/606), resulting in 2. The first case in each facility was selected randomly using a lottery method. Finally, a systematic random sampling technique was used to select all eligible pregnant women by using the PMTCT registration book (Fig. 1).

2.4. Variables of the study

Antenatal depression **was the outcome variable, whereas** maternal age, religion, residence, current marital status, educational status of women, maternal occupation, educational status of the husband,
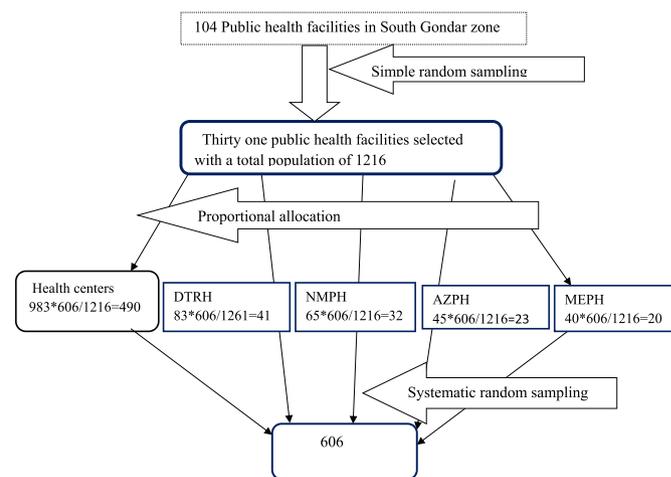
DTRH = Debre Tabor Referral Hospital,   **NMPH**= Nefa Mewcha Primary Hospital

AZPH= Adis Zemen Primary Hospital,   **MEPH** =Mekane Eyesus Primary Hospital

Fig. 1. Schematic presentation of sampling procedure on antenatal depression and associated factors among HIV positive pregnant women attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia 2020/21.DTRH = Debre Tabor Referral Hospital, NMPH= Nefa Mewcha Primary Hospital AZPH = Adis Zemen Primary Hospital, MEPH = Mekane Eyesus Primary Hospital.

occupational status of the husband, and family's monthly income, parity, gestational age, planned pregnancy, mode of delivery in the past, history of abortion, history of stillbirth, number of alive children, chronic medical illness, months on ART, ART adherence, WHO HIV clinical-stage, Having HIV positive child, diagnosed with HIV in this pregnancy, partner's HIV serostatus, opportunistic infections, viral load, social support, internalized AIDS stigma, intimate partner violence, disclosure of HIV status to anyone, disclosure of HIV status to partner, and previous history of depression were independent variables.

2.5. Operational definitions and measurements

Antenatal Depression: The Edinburgh Postnatal/Perinatal Depression Scale (EPDS) has been used to detect depression. The EPDS is a 10 item questionnaire, scored from 0 up to 3 (higher score indicating more depressive symptoms), that has been validated for detecting depression in antepartum and postpartum period in many countries including Ethiopia. We used EPDS cutoff point 13 to identify pregnant women with depression.[28] Those HIV-positive pregnant women who had a score of 13 and above were categorized as depressed, while pregnant women who had a score below 13 were considered as not depressed.[21]

Social support: Was measured using Oslo's three-item social support scale.[29] The respondents who had a score of 3–8 on the Oslo's three-item social support scale were categorized as having a poor social support, 9–11 were categorized as having moderate social support, and 12–14 were categorized as having a strong social support.[30,31]

ART adherence: The four-item Morisky Medication Adherence Rating Scale (MMARS) questionnaire was used to measure ART drug adherence.[32] HIV-positive pregnant women who responded "No" to all the four adherence questions were considered to have ART adherence. Participants who responded "Yes" to one question out of four were considered ART non-adherent.[33]

Internalized AIDS Stigma: AIDS-Related Stigma Scale was used to measure internalized AIDS-related stigma. Study participants have been classified as having or not having stigma using the mean of the stigma variables as the cutoff point. Participants who had scored above the value of the mean were considered as having internalized AIDS-related stigma, whereas, those participants who had a score below the value of the mean were considered as not having internalized AIDS-related stigma.[34,35]

Intimate partner violence: Study participants who respond "Yes" to any one of sexual, psychological, physical, or any combination of the three coercive acts used against HIV-positive pregnant women by their intimate partner. In this study intimate partner was considered as a current spouse, cohabited (live in the same house without formal marriage), Current non-marital partners (boyfriends), former partner or spouse.[36]

2.6. Data collection tools & procedures

The data collection tool was developed by reviewing related literature. Data were collected using structured, pretested questionnaires through face-to-face interviews and chart review. The questionnaires contain socio-demographic characteristics, obstetric-related variables, HIV-related, and psychosocial related variables. Edinburgh Postnatal/Perinatal Depression Scale (EPDS) was used to assess antenatal depression. **Data collection were done by thirty-one BSc midwives who work at PMTCT clinics in the selected health facilities, and five BSc midwives were supervisors.**

2.7. Data quality control measures

The data collection tool was prepared in English and then translated into the local language Amharic then translated back to English to check the consistency. Before the actual data collection, the questionnaire was pretested on 5%[37] of the total sample size at Tach Gyint primary hospital

and Alember health center. Training was given to data collectors and supervisors about the aim of the study, contents of the tool, sampling technique, and also how to give clarification and adequate description for the participants. During data collection, data collectors were supervised for any difficulties. The consistency and completeness of the data were checked by the data collectors and supervisors.

2.8. Data processing & analysis

The data were checked, coded, cleaned, and entered using Epi data version 4.6 and then exported to SPSS version 23 for analysis. Descriptive statistics like frequencies, percentage mean and standard deviation were computed. The analyzed data were presented using text, tables, and graph. The association of each independent variable with the dependent variable was tested using bivariable logistic regression analysis, and all associated variables with a p-value of ≤ 0.2 were entered into the final multivariable logistic regression model to identify independent factors associated with antenatal depression. Adjusted odds ratio (AOR) with 95% CI was computed to determine the presence and strength of association. A p-value of ≤ 0.05 was taken to declare the presence of statistical significance.

3. Results

3.1. Socio-demographic characteristics of study participants

A total of 606 HIV-positive pregnant women were found from the selected health facilities in this study. Of these, 590 participants were interviewed with a response rate of 97.36%. The median age of the participants was 30 years with an interquartile range of (26–35 years) and 57.3% of respondents were between the age group of 25–34 years. Three fourth (75.9%) and more than two-thirds (70.3%) of the women were Orthodox Christians by religion and urban residency, respectively. The majority (84.4%) and more than half (51.9%) of the study participants were currently married and housewives, respectively. Moreover, nearly two-fifths (37.6%) of HIV-positive pregnant women and 26.7% of their husbands were unable to read and write, respectively (Table 1).

3.2. Obstetrics related characteristics of study participants

Among the study participants, more than half (51.4%) of them were para two and above. Two-thirds (75.3%) and 57.6% of the study subjects had planned pregnancy and were in the second trimester, respectively. Nearly one-fifth (18.6%) of women had a history of abortion (Table 2).

3.3. HIV related characteristics of the study participants

Among HIV-positive pregnant women, 85.3% had been diagnosed with HIV positive before the current pregnancy and of these, 42.5% were on ART for longer than 25 months. In this study, 70.5%, 82%, and 94.1% of the study participants had undetected viral loads, stage I HIV/AIDS, and had no opportunistic infections respectively. Nearly half (47.8%) of the women were ART adherent (Table 3).

3.4. Psychosocial characteristics of the study participants

Among the study participants, 42.7% reported that they had experienced intimate partner violence during their current pregnancy. About 44.8% and 48.1% of the study participants had moderate social support and had experienced internalized AIDS-related stigma, respectively (Table 4).

3.5. Prevalence of antenatal depression among HIV-positive pregnant women

The prevalence of antenatal depression among HIV-positive

Table 1

Socio-demographics characteristics of HIV-positive pregnant women who were attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia, 2020/21 (n = 590).

Characteristics	Frequency	Percentage
Maternal age in years		
18–24	90	15.2
25–34	338	57.3
≥35	162	27.5
Residence		
Rural	175	29.7
Urban	415	70.3
Religion		
Orthodox	448	75.9
Muslim	115	19.5
Protestant	27	4.6
Educational status of the women		
Unable to read and write	222	37.6
Able to read and write	101	17.1
Primary(1–8)	100	16.9
Secondary (9–12)	96	16.3
College and above	71	12.1
Maternal occupation		
Employed (governmental/Private)	72	12.2
Housewife	306	51.9
Merchant	84	14.2
Student	27	4.6
Farmer	78	13.2
Daily laborer	23	3.9
Current marital status		
Married	498	84.4
Unmarried[b]	92	15.6
Husbands' educational status (n = 498)		
Unable to read and write	133	26.7
Able to read and write	84	16.9
Primary[1–8]	78	15.7
Secondary[9–12]	76	15.3
College and above	127	25.4
Husbands' occupational status (n = 498)		
Employed (governmental/Private	152	30.5
Merchant	123	24.7
Farmer	159	31.9
Daily laborer	57	11.4
Other[a]	7	1.5
Average monthly income (n = 590)		
≤1000ETB	127	21.5
1001-2000ETB	116	19.7
2001-3000ETB	93	15.8
>3000ETB	254	43.0

[b] ——— single, divorced, widowed.

[a] ———Jobless, driver ETB = Ethiopian birr.

pregnant women was found to be 36.4% (95% CI: 32.7, 40.2).

3.6. Factors associated with antenatal depression among HIV-positive pregnant women

In the bi-variable analysis, the factors had found to be significantly associated with antenatal depression were: unmarried current marital status, parity, unplanned pregnancy, having a chronic medical illness, ART non-adherence, had experienced intimate partner violence in the current pregnancy, poor social support, and had experienced internalized AIDS stigma. Of the variables found to be significant in bi-variable analysis, being unmarried, ART non-adherence, had experienced intimate partner violence in the current pregnancy and had experienced internalized AIDS stigma were factors independently associated with antenatal depression in multivariable logistic regression.

The current study found that developing antenatal depression among currently unmarried HIV-positive pregnant women was 2.77 times higher as compared to currently married women [AOR = 2.77; 95% CI: (1.26, 6.07)].

This study also suggested that participants who were ART non-adherent had 2.18 times higher odds of developing antenatal

Table 2

Obstetrics related characteristics of HIV-positive pregnant women who were attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia, 2020/21 (n = 590).

Characteristics	Frequency	Percentage (%)
Parity		
None	137	23.2
One	150	25.4
Two and above	303	51.4
Trimester of current pregnancy		
1st Trimester	27	4.6
2nd Trimester	340	57.6
3rd Trimester	223	37.8
Pregnancy planned		
Yes	444	75.3
No	146	24.7
Mode previous delivery (n = 453)		
Vaginal delivery	387	85.4
Cesarean delivery	43	9.5
Instrumental delivery	23	5.1
History of abortion		
Yes	110	18.6
No	480	81.4
History of stillbirth		
Yes	19	3.2
No	571	96.8
Number of alive children		
None	141	23.9
One	158	26.8
Two and above	291	49.3
Chronic medical illness		
Yes	42	7.1
No	548	92.9

Table 3

HIV related characteristics of HIV-positive pregnant women who were attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia,2020/21 (n = 590).

Characteristics	Frequency	Percentage
When Diagnosed with HIV		
In this pregnancy	87	14.7
Before this pregnancy	503	85.3
For how long on ART(in months)		
≤6 months	136	23.1
7–24 months	203	34.4
≥25 months	251	42.5
ART Adherence		
Yes	282	47.8
No	308	52.2
Viral load		
Not detected	416	70.5
<1000	76	12.9
≥1000	77	13.1
Unknown	21	3.5
WHO HIV clinical stage		
Stage I	484	82
Stage II and above	106	18
Opportunistic infections		
Yes	35	5.9
No	555	94.1
Partners' HIV sero-status		
HIV positive	482	81.7
HIV negative or Unknown	108	18.3
Do you have HIV positive children (n = 449)		
Yes	46	10.2
No or unknown status	403	89.8

depression than those participants who were ART adherent [AOR = 2.18, 95% CI: (1.50, 3.18)].

In addition, the odds of antenatal depression were 1.50 times higher among HIV-positive pregnant women who had experienced intimate partner violence in the current pregnancy than their counterparts [AOR = 1.50, 95% CI: (1.05, 2.15)].

Table 4

Psychosocial related characteristics of HIV-positive pregnant women who were attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia, 2020/21 (n = 590).

Characteristics	Frequency	Percentage
Intimate partner violence		
Yes	252	42.7
No	338	57.3
Social support		
Poor support	163	27.6
Moderate support	264	44.8
Strong support	163	27.6
Internalized AIDS Stigma		
Yes	284	48.1
No	306	51.9
Disclosure of HIV status to anyone		
Yes	493	83.6
No	97	16.4
Disclosure of HIV status to partner		
Yes	475	80.5
No	115	19.5
History of depression		
Yes	5	0.8
No	585	99.2

Lastly, HIV-positive pregnant women who had experienced internalized AIDS stigma had 1.46 times higher odds of developing antenatal depression as compared to those women who had not experienced internalized AIDS stigma [AOR = 1.46, 95% CI: (1.02, 2.09)] (Table 5).

4. Discussion

Antenatal depression among HIV-positive pregnant women is a devastating problem that directly affects both the health outcome of the mother and the fetus. Hence, this study assessed antenatal depression and associated factors among HIV-positive pregnant women in south

Table 5

Bivariate and multivariable logistic regression analysis of factors associated with antenatal depression among HIV-positive pregnant women who were attending PMTCT service in South Gondar zone public health facilities, northwest Ethiopia,2020/21 (n = 590).

Variable	Depression		COR(95%CI)	AOR(95%CI)
	Yes	No		
Current marital status				
Married	174	324	1	1
Unmarried	41	51	1.49 (0.95,2.35)	**2.77 (1.26, 6.07)***
Parity				
None	54	83	1.32 (0.87, 2.00)	0.65 (0.33, 1.31)
One	61	89	1.39 (0.93, 2.08)	1.52 (1.00,2.32)
Two and above	100	203	1	1
Planned pregnancy				
Yes	151	293	1	1
No	64	82	1.51 (1.03, 2.22)	1.19 (0.76, 1.85)
Chronic medical illness				
Yes	22	20	2.02 (1.08, 3.80)	1.62 (0.83, 3.18)
No	193	355	1	1
ART Adherence				
Yes	75	207	1	1
No	140	168	2.30 (1.62, 3.25)	**2.18 (1.5, 3.18) ****
Intimate partner violence				
Yes	112	140	1.82 (1.30,2.56)	**1.50 (1.05, 2.15)***
No	103	235	1	1
Social support				
Poor support	73	90	1.55 (0.99,2.42)	1.19 (0.74,1.92)
Moderate support	86	178	0.92 (0.61,1.39)	0.75 (0.49,1.17)
Strong support	56	107	1	1
Internalized AIDS Stigma				
Yes	122	162	1.72 (1.23,2.42)	**1.46 (1.02, 2.09)***
No	93	213	1	1

COR= Crude odds ratio, AOR = Adjusted odds ratio, CI=Confidence interval.
* P-value ≤0.05, ** P-value ≤0.001.

Gondar zone, northwest Ethiopia. The study result showed that the prevalence of antenatal depression was 36.4% (95% CI: 32.7, 40.2).

The current study is higher than the studies done in Malawi 9.5%,[23] Tanzania 25%,[22] and Ukraine 27%.[38] The discrepancy of this study with study in Malawi might be due to different socio-demographic statuses. The majority of the study participants for the study in Malawi were currently married women compared to the current study participants (90% vs 84.4%). So, married women might have psychological and financial support from their husbands, this has a role in decreasing antenatal depression.[22]

The possible explanation for the discrepancy from a study in Tanzania might be due to the difference in the educational status of the study participants. Most of the study participants in Tanzania were in primary education and above compared to this study (98% vs 45.3). This is evidenced by depression is more prevalent among less educated people.[39] This may be due to lower educational status associated with lower socioeconomic status, financial dependency, and unemployment. In addition, they may have misconceptions about HIV and prone to perceive AIDS-related stigma and social withdrawal results in depression.

The discrepancy from a study in Ukraine might be due to most of the study participants in Ukraine had disclosed their HIV-positive status compared to the study participants in the current study (91% vs 83.6%). So, disclosed HIV-positive status is associated with decreased depression by increasing social support from their friends, families, children, and partner.[40]

The current study is in line with studies conducted in Zimbabwe 39.4%[25] and America 36%.[26]

On the other hand, the finding of this study is lower than the study reported from South Africa 48%.[21] The variation of this study from the study in South Africa could be due to differences in the inclusion criteria. The current study used HIV-positive pregnant women in all trimesters while, the study in South Africa used women at a gestational age of 20 weeks and above. The possible explanation might be as gestational age increases and close to the date of delivery the women would be more worried about the coming delivery and the health of the fetus. Thus, antenatal depression increases during mid and late trimesters.[41]

The current study found that current marital status was a significant predicting factor for antenatal depression. Thus, developing antenatal depression among currently unmarried HIV-positive pregnant women was 2.77 times higher as compared to currently married women. Similar findings were reported by a study conducted in Tanzania[22] in which the likelihood of antenatal depression is higher among currently unmarried women. This could be because psychological, social, financial, and emotional support by the partner has a major role in decreasing depression during pregnancy.[42] Evidence supports that unmarried women are highly prone to social, economic, and psychological challenges that may increase the occurrence of depression.[43] Moreover, societal norms and culture may contribute to this variation in which being a single mother is unacceptable in the community.

The current study also suggested that participants who were ART non-adherent had 2.18 times higher odds of developing antenatal depression than those participants who were ART adherent. This finding is supported by a similar study conducted in South Africa.[21] This might be due to the fact that if patients did not adhere to ART medications may have poor viral suppression and more immune compromission. Besides, ART non-adherence could associate with the progression of HIV disease to advanced stages and increase the risk of MTCT.[15,44] These, in turn, will lead to an increased risk of depression due to poor quality of life and the inability to cope with daily activities.

The odds of antenatal depression were 1.50 times higher among HIV-positive pregnant women who had experienced intimate partner violence in the current pregnancy than their counterparts. This finding is consistent with studies done in South Africa,[21] Malawi,[23] and Zimbabwe.[25] This could reveal that psychological, physical, and sexual abuse by the intimate partner particularly during pregnancy could lead

to depression.

Lastly, this study showed that those HIV-positive pregnant women who had experienced internalized AIDS stigma had 1.46 times higher odds of developing antenatal depression as compared to those who had not experienced internalized AIDS stigma. This finding is supported by a study done in South Africa.[45] Having HIV, which is one of the chronic life-long disease and is prone to high levels of stigma. So patients may prefer withdrawal from society to avoid stigma so that, feelings of exclusion or loneliness may lead to depression.

5. Conclusion

More than one in three HIV-positive pregnant women had antenatal depression. Being unmarried, had experienced intimate partner violence during the current pregnancy, had experienced internalized AIDS stigma and ART non-adherence were factors independently associated with antenatal depression among HIV-positive pregnant women. Therefore, there is a need to integrate routine screening for antenatal depression and intervention in antenatal care service especially in the PMTCT care settings.

Ethical approval and consent to participate

Ethical clearance for the study was obtained from Institutional Review Board (IRB) of the University of Gondar. Support letters were submitted to the selected health facilities and permission of facilities was obtained from the demonstratives. After a detailed explanation of the purpose and benefits of the study to the study participants, informed written consent was taken. Personal identifying details were not recorded. The interview was conducted in a separate room in the PMTCT clinic. The questionnaires and all data taken from the participants were kept locked in safe places and used only for the study purpose. The study participants who had the idea of suicide were counseled by the health care providers and were advised to visit the psychiatric clinic for better evaluation and treatment.

Consent for publication

Not applicable.

Availability of data and materials

The authors declare that the data regarding this manuscript can be accessed as per the request of any interested body.

List of abbreviations

AIDS   Acquired Immune Deficiency Syndrome
AOR   Adjusted Odds Ratio
ART   Antiretroviral Therapy
CI   Confidence Interval
COR   Crude Odds Ratio
EPDS   Edinburgh Postnatal Depression Scale
HIV   Human Immunodeficiency Virus
MTCT   Mother to Child Transmission
PMTCT   Prevention of Mother to Child Transmission

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